

# Start-Up and Service Instructions

International Series  
51CM,GM,ZM,CV,GY

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## START-UP

Refer to operating instructions in Owner's Handbook provided with room air conditioner

## SERVICE

**General Notes** — These Start-Up and Service Instructions are provided to assist the trained and qualified service technician in repairing or replacing components of Carrier room air conditioner models produced in 1988, specifically International Series models (51CM,GM,ZM Cooling Only, 51CV,GY Cooling and Electric Heat) Other Carrier models for prior years have separate Start-Up and Service publications

**IMPORTANT** Repairing and servicing air conditioners can be hazardous for untrained individuals. The instructions printed in this publication are for properly trained and qualified Carrier service technicians only.

### ⚠ WARNING

Before working on any air conditioner, be sure to first disconnect all electric power to the unit to avoid the possibility of electrical shock and personal injury.

Discharge capacitors before disconnecting, by shorting across terminals

Shield coils with cardboard to protect hands against injury from sharp metal edges when removing compressor and other components

When disassembling wiring, use numbered stickers to identify wire leads and terminals. This aids in quick, accurate reassembly.

Check clearances around scroll and housing before installing fans. Before securing fan setscrews, rotate fan by hand to ensure ample clearance.

Refer to Carrier Standard Service Techniques, Chapters 1 and 2, for information on checking motors, removing refrigerant, adding oil, evacuating, dehydrating and charging system. Pay particular attention to all safety warnings for these procedures.

**Compressor Replacement** — Stand clear of compressor terminals when working on compressors. With system under pressure, terminals may blow. Observe the same safety procedures for rotary compressors as for reciprocating compressors.

When changing compressors:

- 1 Follow all safety codes. Reminder: use protective goggles, work gloves and water-soaked quenching cloth.
- 2 Shut off electric power and remove wiring from compressor.
- 3 Purge or remove all refrigerant and pressure from system.
- 4 Cut suction and discharge lines. Use tubing cutter at convenient location on tubing, near compressor, to ease reassembly using copper slip couplings.
- 5 Remove compressor from unit. Protect compressor from heat and carefully unbrazing piping stubs.

### ⚠ CAUTION

Oil vapor in piping stubs can ignite from torch flame and cause serious injury. Exercise extreme care when brazing, and keep brazing cloth and fire extinguisher handy for emergency use.

- 6 Install oil piping stubs on new compressor and carefully braze into place.
- 7 Clean system: add or replace liquid line filter drier. Refer to System Cleaning, and System Flushing.
- 8 Install new compressor and braze into place with field-supplied copper slip couplings.
- 9 Connect wiring, replace wire terminals if necessary.
- 10 Proceed with evacuation, charging and start-up.

It is much easier to unsweat a short piece of tubing from the compressor *after* you have removed the compressor from the unit. It follows that you can solder the oil piping stub into the new compressor fittings more easily *before* the compressor is put back into the unit.

If you choose a good tubing location for cutting the refrigerant lines initially, the location is easily accessible when making the final joints.

## SAFETY REMINDERS

- 1 Carry a fire extinguisher in your truck. Keep it within reach when using a torch. Check fire extinguisher periodically to be sure it is fully loaded and functional.
- 2 Know how to handle oxyacetylene equipment safely. Lock the equipment in an upright position in the truck and at the job site.
- 3 Use dry nitrogen or carbon dioxide to pressurize the system for leak checking. Always use a good regulator. Be careful not to exceed 150 psig test pressure in the hermetic compressor.
- 4 Wear your safety goggles and gloves when removing refrigerant from a system.
- 5 Attend your shop safety meetings.

## Preventive Maintenance

**CLEANING** — Clean cooling coil and condenser coil. Hold flashlight behind coil to see if all spaces are clear. Use a hooked wire to remove dirt. Dust accumulation obstructs or reduces airflow and results in loss of capacity. Coils may be vacuumed when dry. Outdoors, unit can be brushed with a stiff brush and fins blown out with compressed air.

Thoroughly clean basepan, motors, fan wheels, other components and all drain passages. Vacuum insulation. Clean all inside painted surfaces with mineral spirits to remove grease.

Clean cabinet and grille. Mild detergents reduce electrostatic charges on plastic sections of the grille and are good cleaners. *Do not use* carbon tetrachloride, solvents or waxes containing solvents to clean plastic sections.

**PAINTING** — Paint any parts that show evidence of rust with a good rust-resistant paint.

**WIRING** — Check all wiring for deterioration and all electrical contacts for tightness and lack of corrosion.

**LEAKS** — Check any connections that show evidence of oil or leaks. When unit is properly installed, centered and leveled (see MOUNTING), check gaskets and wing panels for possible air leakage.

**MOUNTING** — Make sure unit is secure in window, level from left to right, and from front to rear according to installation instructions provided.

If used, check compressor mounting springs and replace if necessary. Springs tend to lose their tension with use. This could lead to noisy operation.

Check fans to ensure they are correctly positioned, centered in orifice and tight on shaft.

**CONTROLS** — Check unit to ensure all controls are functioning correctly and unit operation is normal.

Vibrations can cause unwanted noise. Check to be sure no piping is vibrating against any side of unit.

**System Cleaning** — A motor burnout is recognized by the burnt odor of the refrigerant system. When the motor of a hermetically sealed compressor burns out, the insulation of the stator winding forms carbon, water and acid. After burnout, clean refrigerant circuit before a new motor-compressor is installed. Installation of a new capillary and strainer is also recommended when replacing a compressor after burnout.

The system is partially cleaned by back flushing with refrigerant vapor blown into the suction line and out the discharge just before connecting the new compressor. If this method is chosen, install a Sporlan CO52S (Carrier No. KH41EZ246) filter drier or equal in the liquid line, using a capillary tube adapter (Carrier Part No. DEC3680001). An alternate and equally satisfactory method follows under System Flushing.

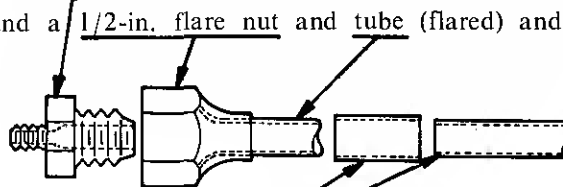
**NOTE** Damage to a new compressor caused by failure to clean the system as recommended is not covered by the product warranty.

**System Flushing** — Flush with liquid R-22 refrigerant before the suction line is connected to the new compressor.

- 1 Clean, flux and solder discharge line to new compressor.

**NOTE** Compressor valves keep refrigerant from backing out through compressor.

- 2 Make a 1/4-in. connection to suction line. For example, use a 1/2-in. x 1/4-in. flare reducing coupling and a 1/2-in. flare nut and tube (flared) and a



1/2-in. sweat coupling that connects to the system 1/2-in. suction line. For other size suction lines use

proper size fittings to make the connection. Connect 1/4-in. fitting to a refrigerant drum by using charging hose or 1/4-in. tubing.

- 3 Cut off the end of the pigtail on the discharge line. Flare and install a 1/4-in. stop valve or (preferably) a charging manifold.
- 4 Invert drum and charge liquid refrigerant.
- 5 Open discharge valve and allow to purge slowly until liquid Freon comes, then close valve.

- 6 Close valve on refrigerant drum and allow refrigerant to remain in piping at least 15 minutes.
- 7 Open valve on discharge stub and allow refrigerant to blow out quickly. Be careful not to stand in front of valve when purging. Protect hands from refrigerant burns with cloth.
- 8 Disconnect refrigerant drum and unsolder connection to suction line.
- 9 Proceed with remainder of installation.

Table 1 — Unit Model Numbers (104, 304, 404)

MODEL 51	CASING	MODEL 51	CASING	MODEL 51	CASING
ZMA705101	104	CMA109101	304	GMA009101	404
ZMA705111		CMB112111		GMA114101	
ZMA706101		CMB112103		GMA118301	
ZMA706103		CMC012311		GMA121301	
ZGA706103		CMB012313		GMA121311	
ZMA007913		CMA012903		GMA124301	
ZGA007903		CMB012913		GMA228301	
ZMA007703		CGA012903		GMA118703	
ZMA008101		CMA012703		GYA318703	
ZMA008103		CVA212703		GMA224703	
ZGA008103		CMA115301			
ZMA008703		CMB115303			
ZMA009913		CMA118903			
ZGA009903		CGA118903			
ZMA009703		CMB118313			
ZMA009303		CMA118703			
ZMB009703		CMA115703			

Table 2 — Physical and Electrical Data (Single Phase, 60 Hz) — 1988

MODEL 51	CAPACITY (Btuh)		R-22 CHG (oz ± 5 - 0)	WET BULB ( Δ F)	VOLTS	NAMEPLATE*				FAN MOTOR		PF (%)	EER (DOE)	CASING	COMPR	CAPILLARY		START THERMISTOR
						Amps		Watts								Data	Insertion	
	Cool	Heat				Cool	Heat	Cool	Heat	FLA	Hp							
ZMA705101	5,200	—	15.5	9.8	115	5.6	—	580	—	93	1/16	90	9.0	104	T-1	C-1	CI-1	Z-1
ZMA705111	5,200	—	15.5	9.8	115	5.8	—	580	—	93	1/16	90	9.0	104	T-1	C-1		
ZMA706101	6,100	—	15.0	12.1	115	6.3	—	665	—	93	1/16	92	8.2	104	T-2	C-2		
ZM,ZGA706103	6,100	—	15.0	12.1	115	6.3	—	665	—	93	1/16	92	9.2	104	T-2	C-2		
ZMA008101	7,600	—	18.0	15.5	115	8.1	—	845	—	93	1/16	91	9.0	104	T-3	C-3		
ZM,ZGA008103	7,600	—	18.0	15.5	115	8.1	—	845	—	83	1/16	81	9.0	104	T-3	C-3		
ZMA009303	8,000/ 8,900	—	20.0	16.5/16.4	230/208	4.2/ 4.6	—	900/ 890	—	61	1/16	93	10.0	104	T-5	C-4		
CMA109101	8,800	—	23.0	9.8	115	8.6	—	930	—	1.40	1/12	98	8.5	304	T-7	C-8	CI-2	Z-1
CMB112111	12,000	—	30.0	11.2	115	12.0	—	1335	—	1.40	1/12	93	8.0	304	T-8	C-8		
CMB,CGA112103	12,000	—	30.0	11.2	115	12.0	—	1335	—	1.40	1/12	93	8.0	304	T-8	C-8		
CMC012311	11,800/11,700	—	32.0	10.9	230/208	5.8/ 6.2	—	1285	—	70	1/12	88	8.2/8.1	304	T-8	C-19		
CMB012313	11,800/11,700	—	32.0	10.9	230/208	5.9/ 6.2	—	1285	—	70	1/12	98	8.2/9.1	304	T-8	C-19		
CMA115301	15,000/14,800	—	38.0	13.1	230/208	7.5/ 7.9	—	1630/1610	—	80	1/8	97	9.2/8.2	304	T-12	C-7		
CGA,CMB115303	15,000/14,800	—	38.0	13.1	230/208	7.5/ 7.9	—	1630/1610	—	90	1/8	97	9.2/9.2	304	T-12	C-7		
CMB118313	18,000/17,800	—	32.0	14.0	230/208	9.2/10.2	—	2140/2120	—	.90	1/8	98	8.4/8.4	304	T-14	C-11	CI-3	Z-1
GMA009101	9,000	—	27.0	6.5	115	7.2	—	750	—	1.11	1/10	93	12.0	—	T-17	C-10		
GMA114101	13,500	—	27.0	8.6	115	12.0	—	1320	—	3.10	1/4	98	10.2	—	H-1	C-13		
GMA118301	18,000/17,700	—	40.0	12.1	230/208	8.7/ 8.5	—	1850/1920	—	1.00	1/8	97	9.2	—	MA-1	C-14		
GMA121301	20,500/20,000	—	44.0	14.5	230/208	10.3/11.0	—	2220/2165	—	1.11	1/8	94	9.2	404	T-14	C-15		
GMA121311	20,500/20,000	—	38.0	14.5	230/208	10.3/11.0	—	2220/2165	—	1.11	1/8	94	9.2	—	MA-2	C-15		
GMA124301	23,500/23,000	—	39.0	15.8	230/208	11.3/12.0	—	2550/2500	—	1.60	1/4	88	9.2	—	T-22	C-20		
GMA228301	27,500/27,000	—	40.0	18.7	230/208	15.2/16.0	—	3350/3290	—	1.60	1/4	96	8.2	—	T-23	C-16		

DOE — Department of Energy  
EER — Energy Efficiency Ratio  
FLA — Full Load Amps  
Hp — Horsepower  
PF — Power Factor

\*Based on AHAM Standard RAC-1 and ANSI Z234.1

Δt — Entering wet-bulb temperature minus leaving wet-bulb temperature based on 67 F room wet-bulb temperature and 95 F dry-bulb outside air temperature. If conditions vary, wet-bulb Δt will vary.

Table 3 — Physical and Electrical Data (Single Phase, 50 Hz) — 1988

MODEL 51	CAPACITY (Btuh)		R-22 CHG (oz ± 5 - 0)	WET BULB ( ΔtF)	VOLTS	NAMEPLATE*				FAN MOTOR		PF (%)	EER (DOE)	CASING	COMPR	CAPILLARY		START THERMISTOR
	Cool	Heat				Amps		Watts		FLA	Hp					Data	Insertion	
						Cool	Heat	Cool	Heat									
ZMA007913	7,000	—	18.5	15.9	200	4.4	—	780	—	44	1/20	89	9.0	104	MI-1	C-5	CI-1	Z-1
ZGA007903	7,000	—	18.5	15.9	200	4.4	—	780	—	44	1/20	89	9.0		MI-1	C-5		
ZMA007703	7,000/ 6,800	—	16.0	14.9	240/220	3.8/ 4.0	—	780/ 755	—	41	1/20	86	9.0		T-4	C-4		
ZMA009913	9,000	—	17.0	21.0	200	5.6	—	1000	—	44	1/20	89	9.0		MI-2	C-6		
ZGA009903	9,000	—	17.0	21.0	200	5.6	—	1000	—	44	1/20	89	9.0		MI-2	C-6		
ZMA009703	9,000/ 8,750	—	18.0	20.2/20.0	240/220	4.5/ 4.7	—	950/ 920	—	41	1/20	88/89	8.0		T-6	C-6		
ZMA008703	8,000/ 7,775	—	18.0	20.2/20.0	240/220	4.5/ 4.7	—	995/ 965	—	41	1/20	92/93	8.0		T-6	C-6		
ZMB009703	8,500/ 8,250	—	18.0	20.2/20.0	240/220	4.5/ 4.7	—	995/ 965	—	41	1/20	92/93	8.0	T-6	C-6			
CMA012903	12,000	—	29.0	12.3	200	6.2	—	1265	—	60	1/12	92	9.5	304	T-11	C-9	CI-2	Z-1
CMA012703	12,000/11,900	—	32.0	10.6	240/220	5.6/ 6.0	—	1265/1250	—	80	1/12	96	9.5		T-10	C-10		
CVA212703	12,000/11,900	—	32.0	10.6	240/220	5.6/ 6.0	—	1265/1250	—	80	1/12	96	9.5		T-10	C-10		
CMA115703	15,000/14,800	—	29.0	10.8	240/220	7.8/ 8.2	—	1750/1730	—	1.00	1/6	95	8.0		T-13	C-7		
CMA118703	18,000/17,800	—	34.0	12.9	240/220	9.5/ 9.9	—	2220/2200	—	1.00	1/6	97	8.1		T-15	C-11		
CMA118903	18,000	—	34.0	13.2	200	11.9	—	2195	—	1.60	1/6	97	8.2		T-16	C-11		
CMB012913	12,000	—	22.0	10.7	200	7.0	—	1275	—	60	1/12	82	9.4		MI-3	C-12		
CGA012903	12,000	—	22.0	10.7	200	7.0	—	1275	—	60	1/12	82	9.4	MI-3	C-12			
CMB118913	18,000	—	29.0	11.1	200	11.0	—	2115	—	1.60	1/6	96	8.5	404	MI-4	C-11	CI-3	Z-1
CGA118903	18,000	—	29.0	11.1	200	11.0	—	2115	—	1.80	1/6	96	8.5		MI-4	C-11		
GMA118703	18,000/17,500	—	28.0	12.5	240/220	10.4/11.0	—	2250/2190	—	1.10	1/6	90	8.0	404	T-5	C-17	CI-3	Z-1
GYA318703	18,000/17,500	11,300/9,500	28.0	12.5	240/220	10.4/11.0	15.1/14.0	2250/2190	3590/3050	1.10	1/6	90	8.0		T-5	C-17		
GMA224703	24,000/23,500	—	36.0	15.0	240/220	13.7/14.7	—	3000/2940	—	1.50	1/4	91	8.0		T-9	C-18		

DOE — Department of Energy  
EER — Energy Efficiency Ratio  
FLA — Full Load Amps  
Hp — Horsepower  
PF — Power Factor

\*Based on AHAM Standard RAC-1 and ANSI Z234.1

Δt — Entering wet-bulb temperature minus leaving wet-bulb temperature based on 67 F room wet-bulb temperature and 95 F dry-bulb outside air temperature. If conditions vary, wet-bulb Δt will vary.

Table 4 — Compressors

KEY NO	VENDOR MODEL NO	OIL CHARGE (oz $\pm$ 1)		VOLTS	RLA	LRA	RUN CAPACITOR
		Dry	Recharge				
<b>Matsushita</b>							
MA-1	2K25S3R236A-6A	14 5	12 5	230/208	7 4	42 0	RC-4
MA-2	2K32S3R236A-6A	14 5	12 5	230/208	9 6	52 0	RC-6
<b>Mitsubishi</b>							
MI-1	RH421SS	10 1	9 1	200	FLA 4 5	26 0	RC-12
MI-2	RH427SS	19 2	17 3	200	5 6	30 0	RC-8
MI-3	RH434SS	18 0	16 2	200	7 3	38 0	RC-8
MI-4	NH455NB	28 7	25 8	200	9 7	47 0	RC-7
<b>Tecumseh</b>							
H-1	RK5513E	11 8	9 1	115	11 4	67 0	RC-9
<b>Toshiba</b>							
T-1	ERH62XA3-1K	7 4	6 7	115	5 2	35 0	RC-3
T-2	ERH68XA3-1K	7 4	6 7	115	5 9	35 0	RC-3
T-3	EH88X1-1CU1	7 4	6 7	115	7 5	41 0	RC-3
T-4	PRH94XA4-4K	7 4	8 7	240/220	3 4	20 0	RC-1
T-5	PRH88XA4-3K	7 4	6 7	230/208	3 9	25 0	RC-1
T-6	PH112X2-4KU	11 0	9 9	240/220	4 0	23 0	RC-2
T-7	ERH88XA4-1K	7 4	6 7	115	7 7	43 0	RC-2
T-8	EH120X2-1KU	10 6	9 5	115	11 6	63 0	RC-5
T-9	PH120X2-3KU	10 6	9 5	230/208	5 4	33 0	RC-2
T-10	PH142X2-4KU	11 0	9 9	240/220	4 5	26 0	RC-2
T-11	PH142X2-9LU	11 0	9 9	200	5 2	27 0	RC-2
T-12	PH160X2-3LU1	14 0	12 6	230/208	6 8	38 0	RC-4
T-13	PH180X2-4LU	14 0	12 6	240/220	6 9	36 0	RC-4
T-14	PH210X3-3LU	20 3	18 3	230/208	9 1	49 0	RC-6
T-15	PH250X3-4LU	20 3	18 3	240/220	8 8	46 0	RC-6
T-16	PH250X3-9LU	20 3	18 3	200	10 2	51 0	RC-6
T-17	EH80X1-1CUI	7 4	6 7	115	—	41 0	RC-9
T-18	PH200X3J-3LTU	20 3	18 3	230/208	—	65 0	RC-6
T-19	PH230X3J-3LTU	20 3	18 3	230/208	20 0	79 0	RC-6
T-20	PH230X3J-4LTU	20 3	18 3	240/220	—	58 0	RC-6
T-21	PH230X3-4LU	20 3	18 3	240/220	—	46 0	RC-6
T-22	PH250X3-3LU	20 3	18 3	230/208	—	63 0	RC-6
T-23	PH310X3-3MU	23 7	21 3	230/208	—	79 0	RC-6
T-24	PH310X3J-4MTU	23 7	21 3	240/220	—	83 0	RC-10
T-25	PH310X3-4MU	23 7	21 3	240/220	—	72 0	RC-11

FLA — Full Load Amps  
 LRA — Locked Rotor Amps  
 RLA — Rated Load Amps

Table 5 — Run Capacitors

KEY NO	CARRIER NO	MFD	VOLTS
RC-1	HC98CA016	15/5	370
RC-2	HC98CA026	25/5	370
RC-3	HC98CA027	25/7 5	370
RC-4	HC98CA036	35/5	370
RC-5	HC98CA031	30/5	370
RC-6	HC98CA046	45/5	370
RC-7	HC98CA050	50/5	370
RC-8	HC98DA031	30/5	440
RC-9	HC98CA028	25/10	370
RC-10	HC98CA062	60/7 5	370
RC-11	HC98CA047	45/7 5	370
RC-12	HC98DA028	25/5	440

MFD — Microfarad

Table 6 — Thermistor

KEY NO	CARRIER NO	VENDOR NO	RESISTANCE (Ohms)
Z-1	HC95XX006	3M305C20C	25

Table 7 — Casing Dimensions (in.)

CASING	HEIGHT	WIDTH	DEPTH
104	14 $\frac{1}{16}$	20 $\frac{1}{16}$	17 $\frac{1}{16}$
304	15 $\frac{1}{16}$	24 $\frac{7}{16}$	27 $\frac{1}{16}$
404	17 $\frac{1}{16}$	26	28 $\frac{1}{16}$

Table 8 — Capillary Data

KEY NO	DIMENSIONS (in.)		
	OD ( ± 002)	ID ( ± 0003)	Length ( ± 25)
C-1	106	049	30
C-2	106	055	39
C-3	106	055	38
C-4	106	054	42
C-5	106	049	26
C-6 (2)	106	049	66
C-7	125	070	34
C-8	125	054	25
C-9	125	064	25
C-10	125	064	35
C-11	125	070	22
C-12	125	064	26
C-13	125	070	26
C-14	125	070	24
C-15 (2)	125	054	18
C-16	106	054	46
C-16 (2)	106	054	34
C-16	106	054	56
C-17 (2)	125	070	36
(Injection)	080	031	36
C-18 (2)	125	070	31
(injection)	080	031	18
C-19	125	064	30
C-20 (2)	125	064	25

Table 9 — Capillary Insertion

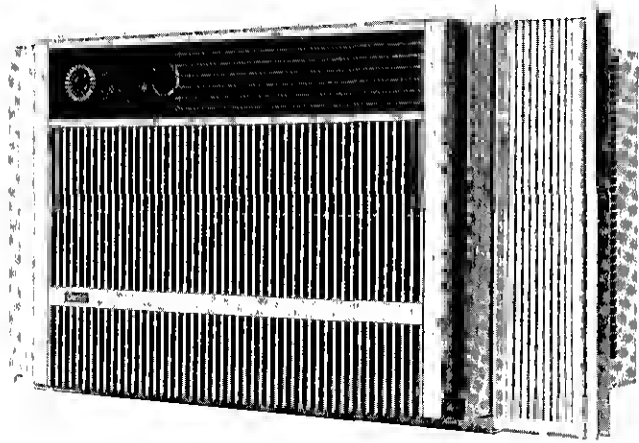
KEY NO	DEPTH (in.)	
	Cond Coil Conn Tube (Max)	Evap Coil Conn Tube (Min)
CI-1	½	½
CI-2	1	1
CI-3	½	1

NOTE Capillary number follows key number. Number capillaries from left to right, facing evaporator inlet, when more than one is used.

## DISASSEMBLY INFORMATION

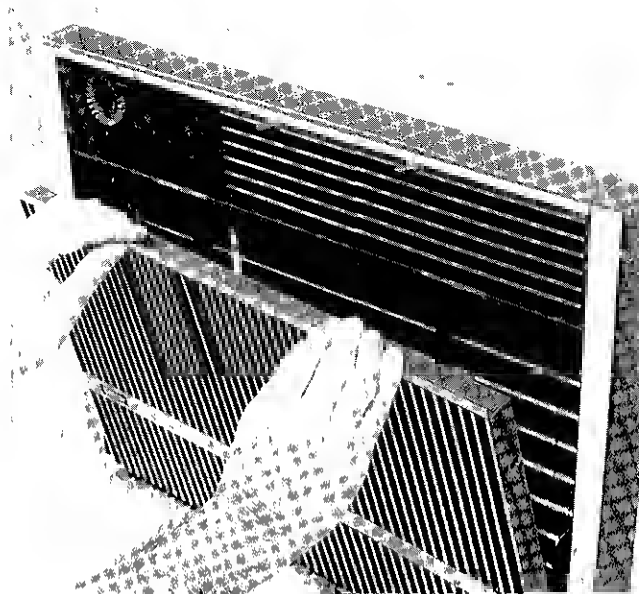
### Model 104's Casing

**Model 51ZM** — The Model 51ZM Room Air Conditioner is referred to as the 104 size casing International Series unit. See Fig 1.



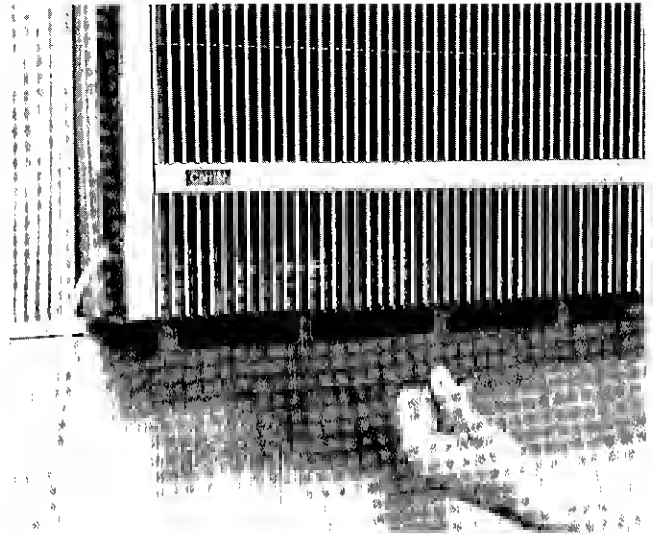
**Fig. 1 — Model 51ZM**

- 1 **Grille** — Decorative front grille insert is removed by gripping top of insert and pulling outward while lifting insert from grille frame. See Fig 2.

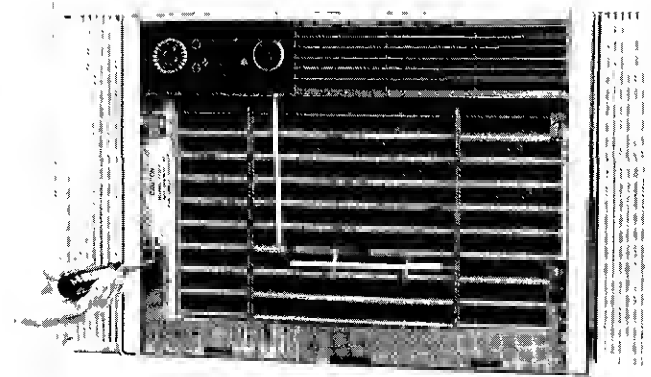


**Fig. 2 — Removing Grille Insert**

- 2 **Filter** — Filter can be removed without having to remove grille insert. Grasp bottom edge of filter (located behind grille insert) and gently pull filter down and slightly toward you. See Fig 3. Filter may be vacuumed, or washed in warm water. Shake filter to remove excess water, dry thoroughly and replace by sliding filter upward behind front grille until filter snaps in place.
- 3 **Grille Frame** — Grille frame is removed by first removing 4 screws holding frame to chassis. See Fig 4. Pull top of grille frame outward and lift frame away from chassis.



**Fig. 3 — Removing Filter**

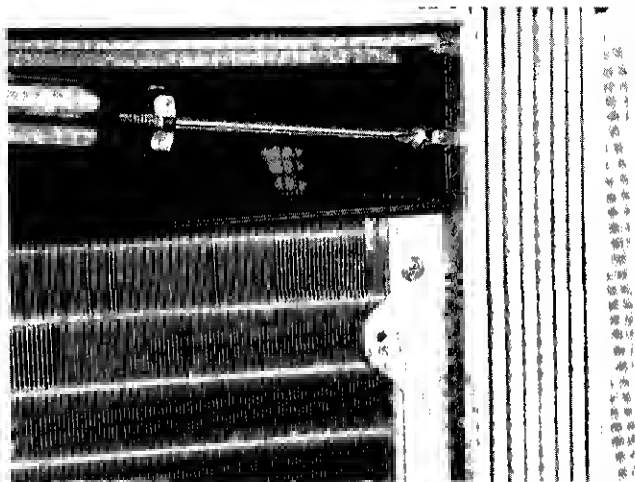


**Fig. 4 — Removing Grille Frame Screws**

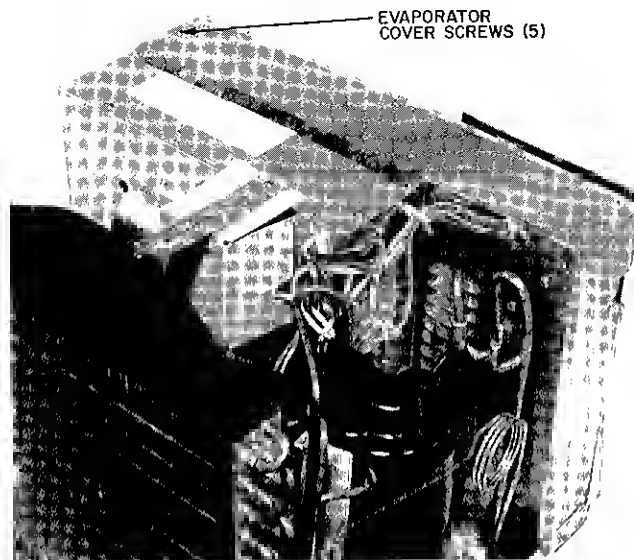
- 4 **Chassis Security Lock Screw** — To slide chassis out of casing, security screw must first be loosened. Loosen screw and slide screw to unlock position (forward). When reinstalling chassis in casing, reverse procedure and tighten screw in lock position. See Fig 5.
- 5 **Chassis** — The International Series models have a slide-out chassis. Servicing the chassis is possible without having to remove unit casing from window. See Fig 6. Use the offset in the basepan as a finger-grip handle to slide chassis out of casing.

#### ⚠ CAUTION

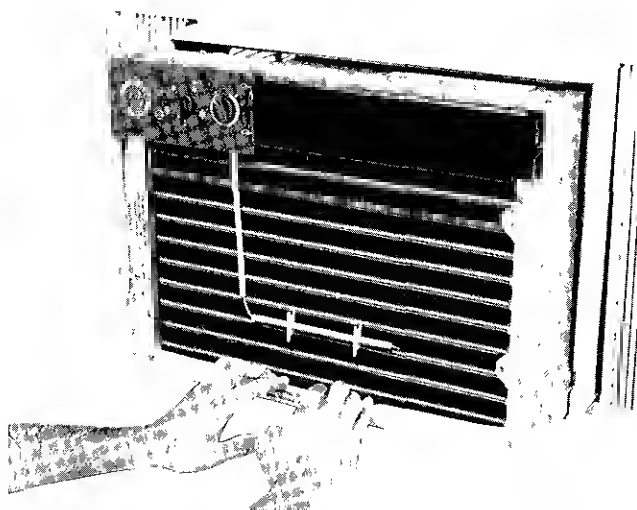
Coil fins are sharp. Use care when removing chassis from casing to avoid personal injury. Do not use plastic parts for lifting or pulling. They are not structural members of the chassis. Lift using basepan only. Chassis is heavy. Obtain assistance for lifting.



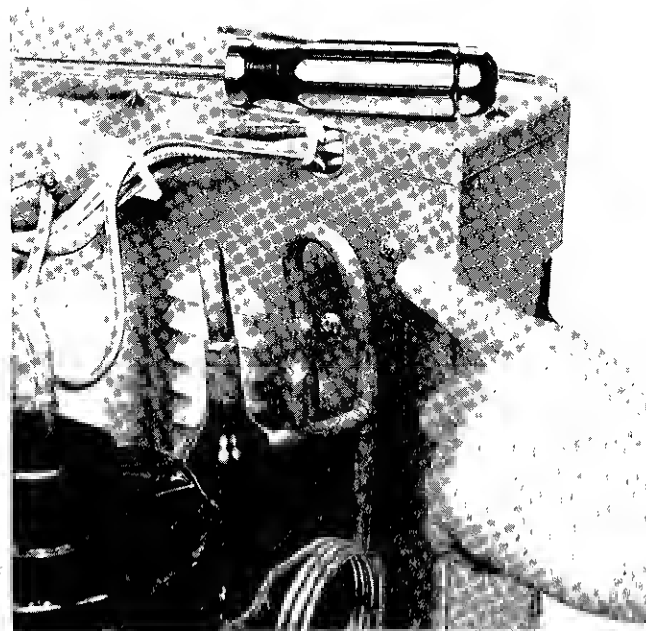
**Fig 5 — Unlocking Chassis Security Lock Screw**



**Fig. 7 — Evaporator Cover Screws**



**Fig 6 — Sliding Chassis Out of Casing**



**Fig 8 — Control Box Screws**

**6 Evaporator Cover** — Remove evaporator by removing 5 screws as shown in Fig 7

**7 Control Box** — Control Box is secured with 2 screws See Fig 8

- a Remove sensing bulb from coil See Fig 9
- b Remove service cord screw See Fig 9
- c Remove control knobs by pulling off See Fig 10
- d Remove escutcheon plate

**8 Timer** — See location of timer in Fig 11

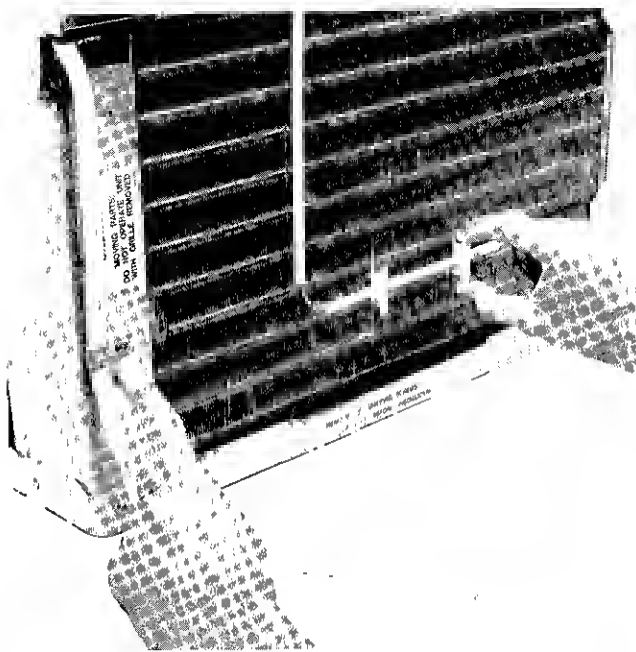
- a Remove 2 screws holding timer to control box
- b Carefully pull wires from timer terminals being sure to label or mark each wire for accurate wire replacement on timer
- c To reinstall timer, reverse above procedure

**9 Cool-Heat Control** — See Cool-Heat Control location in Fig 11

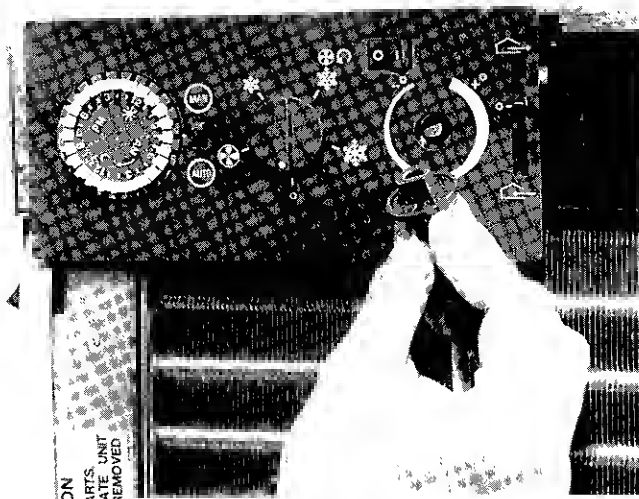
- a Remove 2 screws holding Cool-Heat Control to control box
- b Carefully pull wires from Cool-Heat Control terminals being sure to label or mark each wire for accurate wire replacement
- c Reverse above procedure to reinstall Cool-Heat Control

**10 Fan Cycle Switch** — See Fan Cycle Switch location in Fig 11

- a Remove fan cycle switch using screwdriver as shown in Fig 11

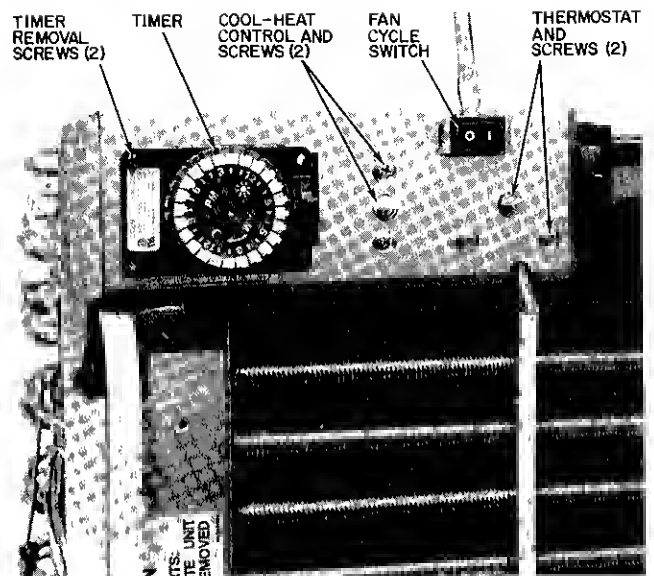


**Fig 9 — Sensing Bulb and Service Cord Screws**



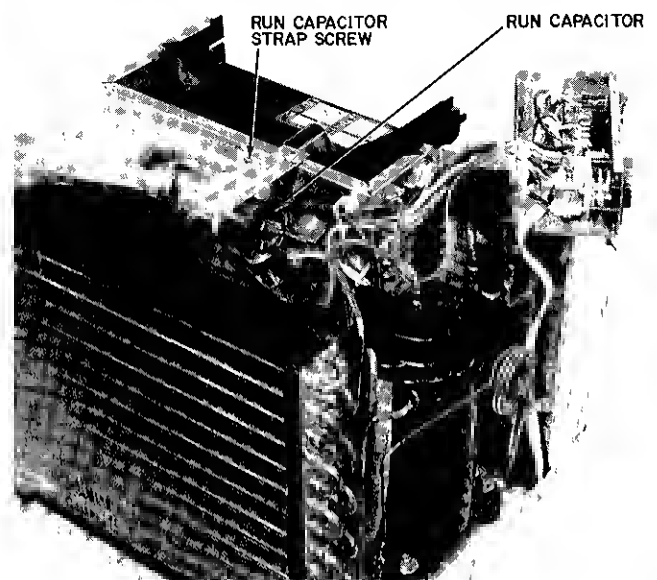
**Fig. 10 — Removing Knobs**

- b Carefully pull wires from terminals of fan cycle switch. Label or mark wires to aid in proper wire replacement.
- c Reverse above procedure for reinstalling fan cycle switch.
- 11 **Thermostat** — See Thermostat location in Fig 11
  - a Remove 2 screws holding thermostat to control box.
  - b Carefully pull wires from thermostat terminals being sure to label or mark wires to aid in correct wire replacement.
  - c Remove insulating sleeves from thermostat bulb.
  - d Remove thermostat and bracket from control box.
  - e Remove thermostat from bracket by removing 2 screws.
  - f Reverse above procedure to reinstall thermostat.



**Fig. 11 — Control Locations**

- 12 **Run Capacitor** — See Run Capacitor in Fig 12
  - a Discharge capacitor before disconnecting by shorting across terminals with a screwdriver.
  - b Remove screw fastening capacitor strap to partition assembly and remove strap.
  - c Carefully pull wires from run capacitor terminal. Mark or label wires for correct reassembly.
  - d Reverse above procedure for reassembly.



**Fig. 12 — Run Capacitor**

- 13 **Fan Motor** — See Fan Motor in Fig 13
  - a Loosen set screw on blower wheel. See Fig 14.
  - b Remove clip from condenser fan. See Fig 14.
  - c Disconnect fan motor wires from control box and capacitor.



- d Remove fan motor leads from wire ties. Identify wires for correct reassembly.
- e Remove fan motor ground wire from partition assembly by removing one screw.
- f Remove 3 screws fastening fan motor to partition assembly. See Fig 13.
- g Pull fan motor carefully toward condenser coil and remove.

**⚠ CAUTION**

Be careful to avoid damaging condenser coil when pulling and removing fan motor.

- h Reverse above procedure for reassembly of fan motor.

**NOTE** For proper orientation of drain holes in replacement motor, check to be sure motor label is facing up. For optimum performance, position blower wheel and propeller fan properly on motor shaft.



**Fig. 13 — Fan Motor**

**FAN MOTOR LUBRICATION** — Fan motor is factory lubricated and requires no lubrication under normal conditions for a period of 5 years. The fan motor should be oiled at the beginning of each cooling season thereafter. If the unit is subjected to heavy usage, dusty atmosphere, or other abnormal conditions, oil motor at the beginning of the first cooling season and each cooling season thereafter.

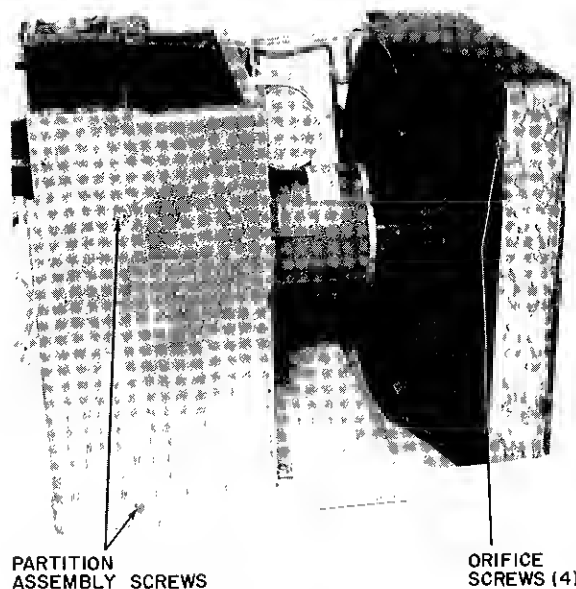
Fan motors have an oil port on each end of the motor. Remove the rubber dust plugs from oil ports and add 4 drops of SAE 20 oil through each port. Be sure to replace plugs after oiling.

**14 Condenser Fan** — See Condenser Fan in Fig 14.

- a To aid in reassembly, mark shaft at point where hub and shaft meet.
- b Remove clip from condenser fan as shown in Fig 14.
- c Remove condenser orifice by removing 4 screws holding condenser orifice to the tube sheet as shown in Fig 15 and 18.

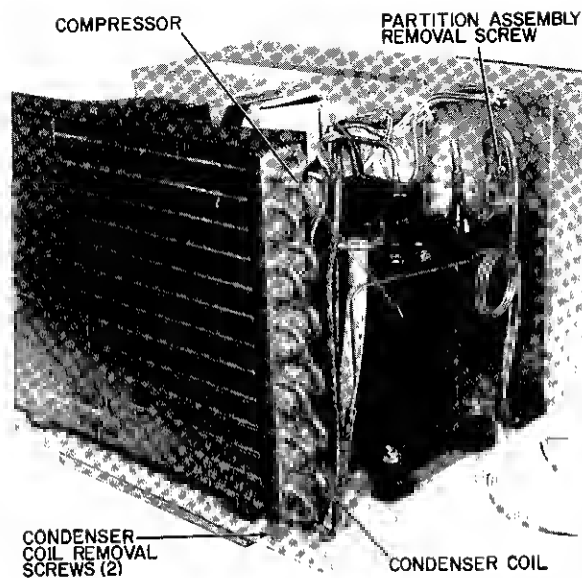


**Fig. 14 — Blower Set Screw and Condenser Fan Clip**

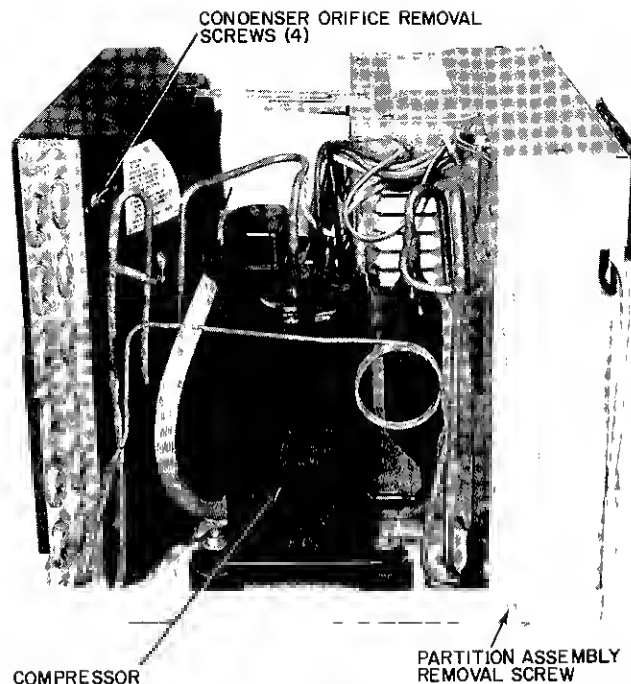


**Fig 15 — Partition and Orifice Assembly Screws**

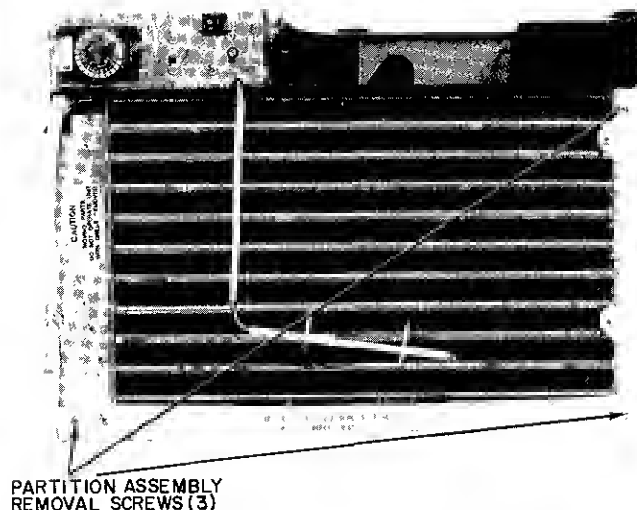
- d Remove 2 screws in back of unit as shown in Fig 16. Carefully lift and pull condenser coil outward.
  - e Reverse above procedure for reassembly.
- 15 Evaporator Blower** — See Evaporator Blower in Fig 14.
- a Remove 3 screws in front of unit as shown in Fig 17.
  - b Remove one screw on compressor side (see Fig 16) which holds evaporator coil tube sheet to partition assembly.
  - c Remove 2 side screws fastening partition assembly to basepan and partition assembly to evaporator coil tube sheet. See Fig 15.
  - d Remove 2 back screws which hold partition assembly to basepan. See Fig 15.



**Fig. 16 — Condenser Coil/Partition Assembly Screws**



**Fig. 18 — Partition Assembly Removal Screws**



**Fig. 17 — Partition Assembly Screws**



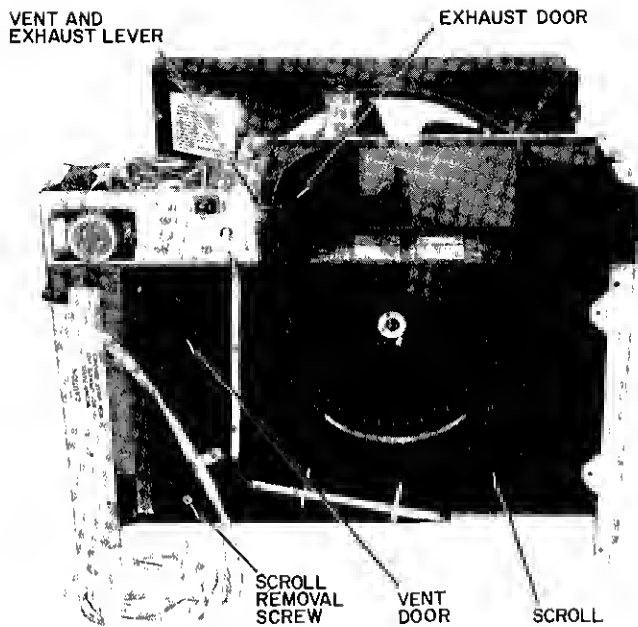
**Fig. 19 — Partition Assembly**

- e Remove screw on compressor side which holds partition assembly to basepan as shown in Fig. 18
  - f Remove 4 screws which fasten condenser orifice to tube sheet. See Fig. 15 and 18
  - g Lift partition assembly out of unit. See Fig. 19. When lifting, carefully grasp secure parts and lift gently. Obtain assistance in lifting if necessary.
  - h Mark shaft at point where blower hub and shaft meet, to aid in reassembly.
  - i Remove screw which holds the evaporator scroll to the partition. See Fig. 20
  - j Remove control box. See Fig. 8. Refer to Control Box removal directions.
  - k Pull evaporator scroll outward.
  - l Reverse above procedure for reassembly.
- 16 **Compressor** — See compressor in Fig. 18. Before removing compressor refer to Service, General Notes in this publication, and Carrier Standard Service Techniques Manual, Chapters 1 and 2.

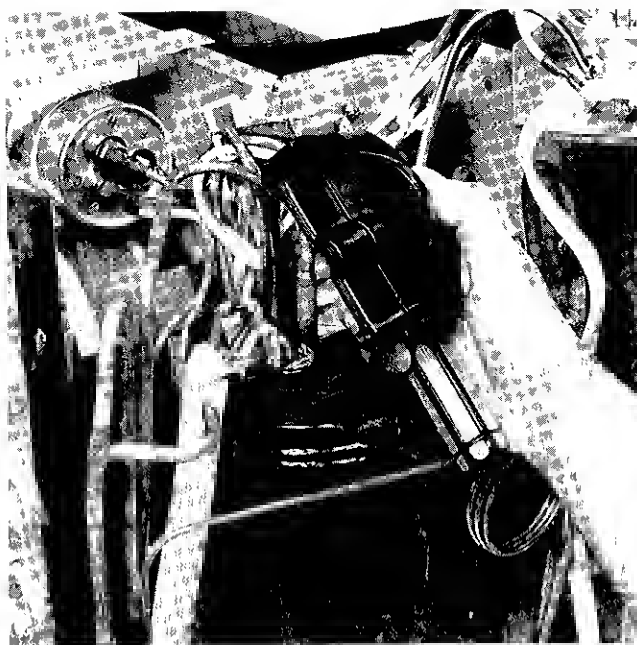
#### **⚠ WARNING**

Compressor terminals may blow with system under pressure. Stand clear of terminals when working on compressor.

- a Remove compressor terminal cover. See Fig. 21
- b Disconnect wires from compressor and overload protector terminals. See Fig. 22. Identify wires to ensure correct reassembly.

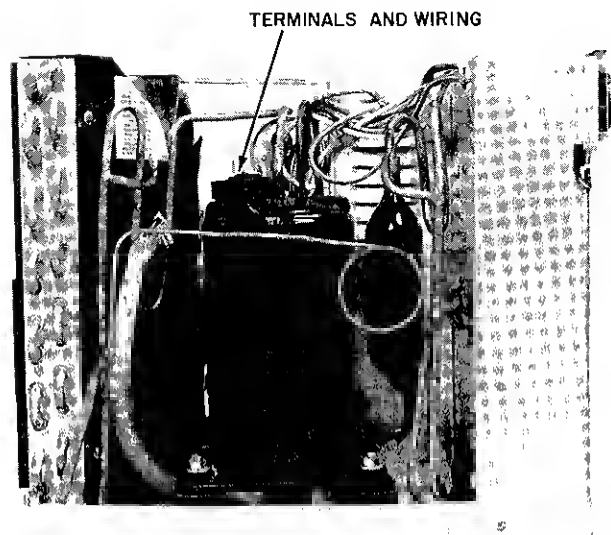


**Fig 20 — Evaporator Scroll**

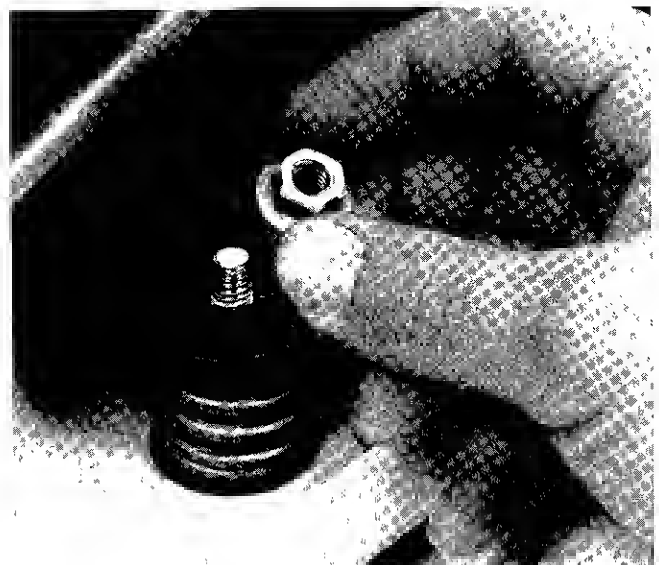


**Fig 21 — Removing Compressor Terminal Cover**

- c Replace overload protector if needed
- d Disconnect piping. Refer to Service in this publication being careful to observe all CAUTIONS
- e Remove compressor mounting nuts. See Fig 23
- f Check compressor mounts. If compressor is mounted on *springs*, remove nuts from mounting studs. See Fig 23. Some mounts also have a washer. Pry off with screwdriver. Failure to remove hardware results in noisy operation. Save hardware for possible future transport of unit. If unit is transported, replace hardware on mounting



**Fig. 22 — Compressor and Overload Protector Wires**



**Fig 23 — Removing Nut from Compressor Spring Mount (not all models)**

- studs. Neglecting this could result in damage to unit when transported.
- g Remove compressor carefully. Obtain help in lifting if necessary.
- h Reverse above procedure for reassembly.
- 17 **Exhaust Door** — See Exhaust Door in Fig 20
  - a Remove metal spring from behind the door.
  - b Pull exhaust door carefully out of mounting slot.
  - c Reverse above procedure for reassembly.
- 18 **Vent Door** — See Vent Door in Fig 20
  - a Remove evaporator scroll as described under Evaporator Blower.
  - b Remove spring from vent door.
  - c Lift vent door up and pull out.
  - d Reverse above procedure for reassembly.

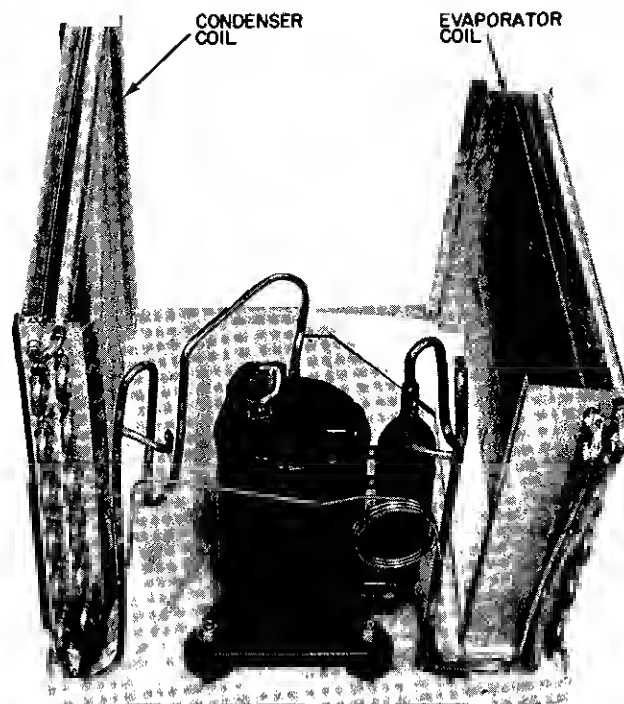
- 19 **Vent and Exhaust Lever** — See Vent and Exhaust Lever in Fig 20
- Remove exhaust door as described under Exhaust Door
  - Rotate lever upward while pushing lever out of mounting slot
  - Reverse above procedure for reassembly
- 20 **Evaporator and Condenser Coils** — See Evaporator and Condenser Coils in Fig 24. These coils have copper tubing. The interconnecting tubing is designed as an integral part of the coils to make servicing easier.
- 21 **Strainer** — The strainer is installed in the interconnecting tubing between the condenser and the capillary tube. To change the strainer:
- Purge and remove all refrigerant from the system
  - Cut tubing one in. from capillary tube insertion point

- Use a thin piece of wire to remove strainer from tubing
- Insert new strainer into tubing. Reassemble with a field-supplied 1/4-in. copper coupling

- 22 **Test Run Unit** — Plug unit into proper power supply outlet. Refer to operating instructions in Owner's Handbook for Comfortable Living. Check all controls for correct operation, then unplug unit. If unit sounds noisy during test-run, it may be because compressor spring-mount nuts have not yet been removed. See Compressor instructions (16 f).

**▲ WARNING**

Moving parts can cause personal injury. Be careful when test-running unit. Do not operate unit with front grille removed.



**Fig 24 — Evaporator and Condenser Coils**

## DISASSEMBLY INFORMATION

### Models 304's, 404's Casings

**Models 51C,G** — The Model 51C Room Air Conditioner is referred to as the 304 size casing International Series unit. The Model 51G Room Air Conditioner is referred to as the 404 size International Series unit. Both are alike in construction and contain identical controls.

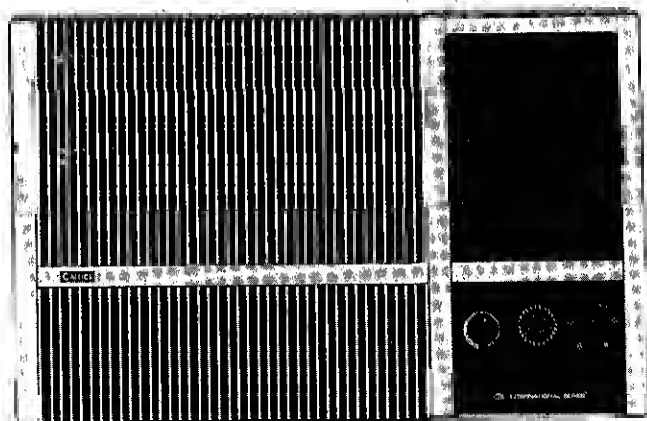
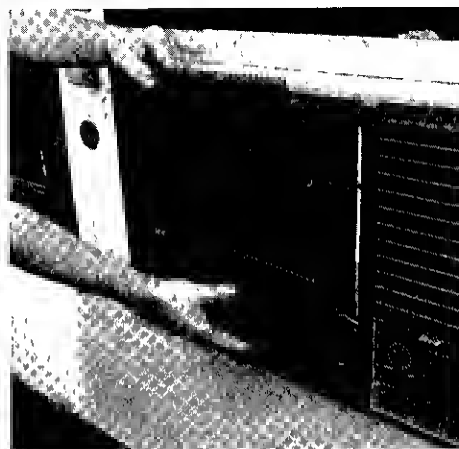


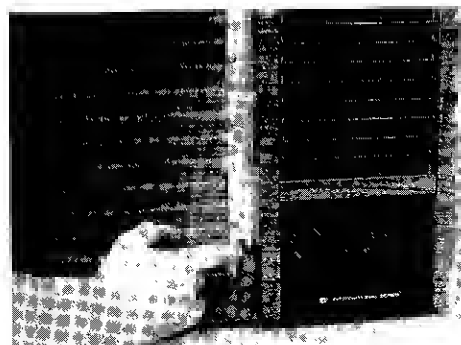
Fig 25 — Model 51C,G

- 23 **Grille** — Decorative front grille insert is removed by gripping top of insert and pulling outward while lifting insert from grille frame. See Fig 26.
- 24 **Filter** — Filter can be removed without having to remove grille insert. Grasp bottom edge of filter (located behind grille insert) and gently pull filter down and slightly toward you. See Fig 27. Filter may be vacuumed, or washed in warm water. Shake filter to remove excess water, dry thoroughly and replace by sliding filter upward behind front grille until filter snaps in place.
- 25 **Grille Frame** — Grille Frame is removed by first removing 1 screw holding frame to chassis. See Fig 26. Pull bottom of grille frame outward and lift frame away from chassis.
- 26 **Control Box** — It is not necessary to slide chassis out of casing in order to service the control box, located on right side of unit behind grille frame. Refer to Fig 25. To remove control box:
  - a Remove grille frame. Refer to grille and grille frame instructions and Fig 26.
  - b Carefully pull off thermostat and cool-heat control knobs.
  - c Remove 2 screws securing escutcheon and remove escutcheon.
  - d Remove 2 screws securing control box to chassis.
  - e Remove sensing bulb from coil face. See Fig 29.
  - f Pull control box straight out of unit carefully.

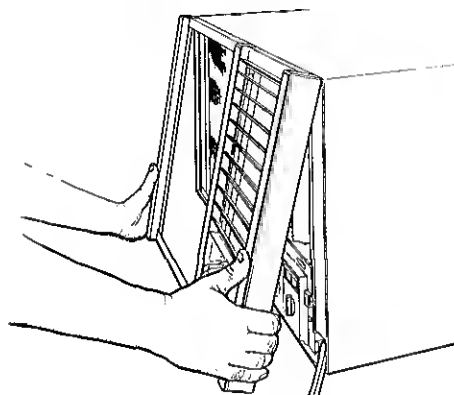
**NOTE** The control box ground wire interferes with complete removal of control box. If ground wire is detached, be sure to replace and secure with wire tie inside control box when servicing is completed.



REMOVE GRILLE INSERT



REMOVE 1 SCREW



PULL AND LIFT GRILLE BOTTOM

**Fig. 26 — Removing Grille Insert and Grille Frame**

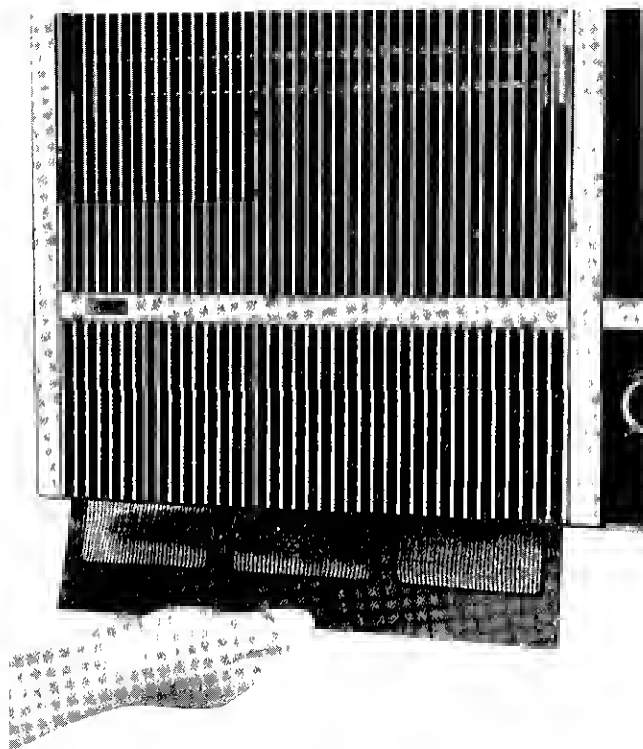


Fig. 27 — Removing Filter

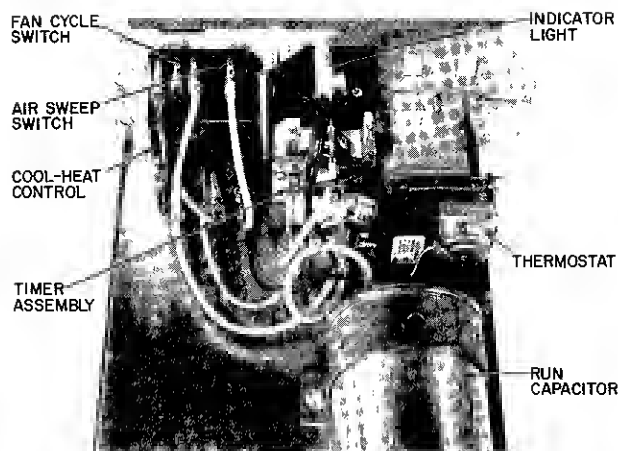
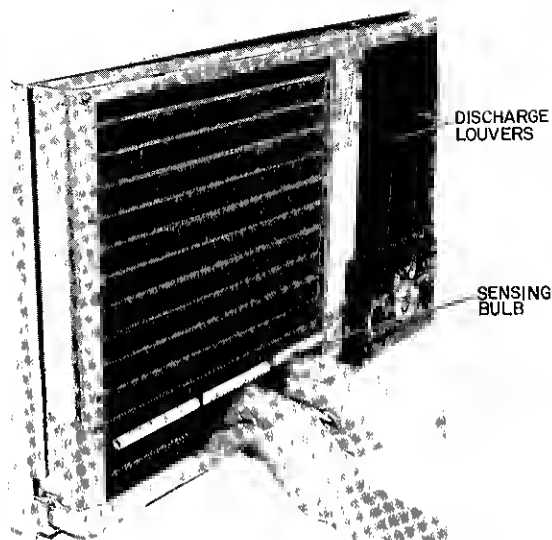


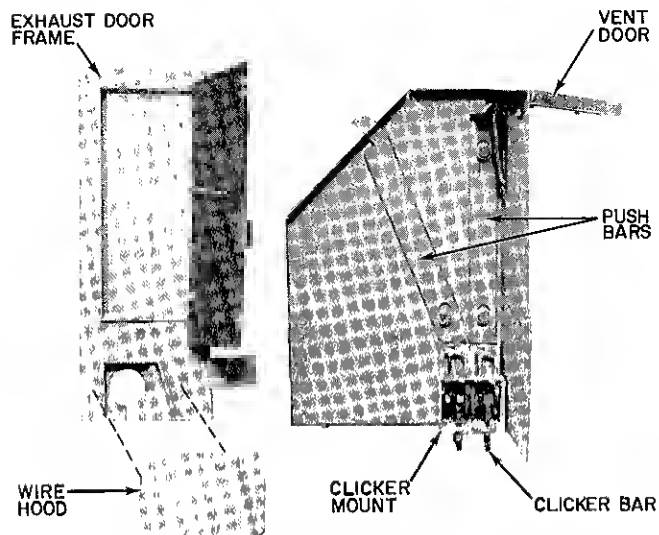
Fig. 28 — Control Box Components

- 27 **Thermostat** — Thermostat is a cross ambient device. Be careful not to damage sensing element of thermostat when handling. See Thermostat location in Fig 28. To remove:
- Slide control box out. Refer to control box instructions.
  - Remove 2 screws from bottom of control box which fasten thermostat bracket to control box. Some units have a third screw located at front of box.
  - Carefully pull wires from thermostat terminals. Mark or label wires to aid in reassembly.
  - Remove thermostat and bracket from control box.
  - Detach thermostat from bracket.
  - Reverse above procedure for reassembly.

- Cool-Heat Control** — See location of Cool-Heat Control in Fig 28.
  - Slide control box out. Refer to control box instructions.
  - Remove 2 screws holding cool-heat control to front of control box.
  - Carefully pull wires from cool-heat control terminals. Mark or label wires to aid in reassembly.
  - Reverse above procedure for reassembly.
- Timer Assembly** — See location of Timer Assembly in Fig 28.
  - Slide control box out. Refer to control box instructions.
  - Remove timer cover by squeezing sides and pulling cover straight out.
  - Carefully remove wires from timer assembly. Mark or label wires to aid in reassembly.
  - Remove 2 screws securing timer and pull timer through front of control box.
  - Reverse procedure for reassembly.
- Run Capacitor** — See location of Run Capacitor in Fig 28.
  - Slide control box out. Refer to control box instructions.
  - Remove screw fastening capacitor strap to control box and remove strap.
  - Carefully pull wires from run capacitor terminals, marking or labeling wires to aid in reassembly.
  - Reverse above procedure for reassembly.
- Indicator Light** — See location of Indicator Light in Fig 28.
  - Slide control box out. Refer to control box instructions.
  - Remove timer cover by squeezing sides and pulling straight out.
  - Disconnect wires from indicator light terminal, marking or labeling wires to aid in reassembly.
  - Remove light by pulling straight out through front of control box.
  - Reverse above procedure for reassembly.
- Fan Cycle and Air Sweep Switches** — See location of switches in Fig 28.
  - Slide control box out. Refer to Control Box instructions.
  - Disconnect wires from switches. Mark or label wires to aid in reassembly.
  - Push switches out from rear.
  - To replace switches, insert them through front of panel, push in until they snap in place.
  - Complete reassembly by reversing above procedure.
- Chassis** — The International Series models have slide-out chassis. Servicing the chassis is possible without having to remove unit casing from window.
  - Remove front grille frame. See Grille instructions and Fig 26.
  - Loosen security lock screw and slide screw to unlock position (left). See unit installation instructions.



**Fig. 29 — Sliding Chassis Out of Casing**

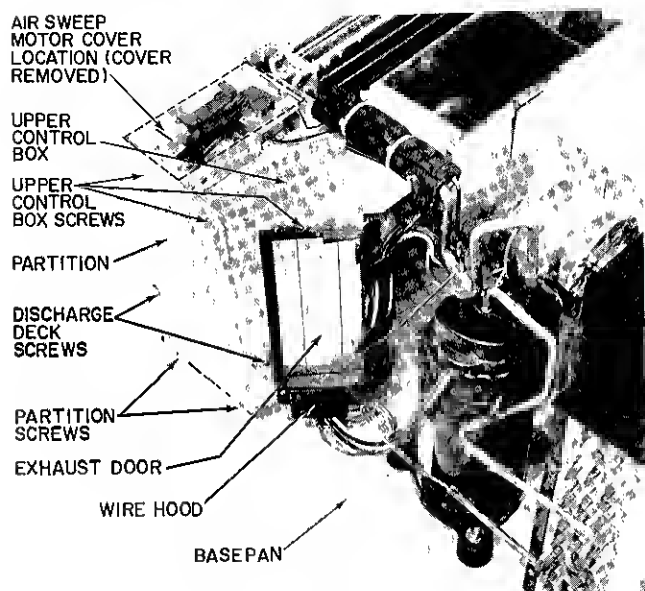


**Fig. 31 — Vent Door/Wire Hood**

- c Slide chassis out of casing See Fig 29
- d Reverse above procedure to reinstall chassis in casing, being sure to return security lock screw to lock position and tighten

**34 Exhaust Door —** See location of Exhaust Door in Fig 30

- a Remove chassis from casing See Chassis instructions
- b Pull exhaust door away from hinge until it is no longer trapped by the door frame
- c Return spring to proper position and remove door
- d Reverse above procedure for reassembly



**Fig. 30 — Exhaust Door**

- b Remove control box See Control Box instructions
  - c Remove discharge louvers See Air Sweep Mechanism instructions
- NOTE Removal of air sweep motor is not necessary

- d Remove one screw securing scroll plate to basepan
- e Remove 3 screws (Fig 30) securing upper control box to partition
- f Remove 2 screws (Fig 30) securing discharge deck to partition
- g Remove one screw (Fig 35) securing discharge deck to scroll plate
- h Remove 3 screws (Fig 30 and 33) securing partition to basepan
- i Lift partition side and place over basepan flange
- j Lift discharge deck assembly and remove from chassis
- k Remove vent door spring from deck assembly and repair or replace parts as necessary
- l Reverse above procedure for reassembly, being careful not to damage wires on sheet metal edges

**36 Fan Section —** See Fan Section in Fig 32

- a Remove chassis from casing See Chassis instructions
- b Remove partition top cover by removing 4 screws
- c Remove wire hood by removing 2 screws See Fig 31
- d Disconnect fan motor wires from control box. Remove fan motor leads from retainers. Mark or label wires to aid in reassembly
- e Remove fan motor ground wire from unit partition
- f Detach condenser orifice by removing 4 screws which attach condenser orifice to tube sheet
- g Remove top gusset by removing 2 screws. Slide slot filler out
- h Remove 2 fan motor clips
- i Gently lift fan assembly out of chassis See Fig 32

**35 Vent Door —** See location of Vent Door in Fig 31

- a Remove chassis from casing See Chassis Instructions and Fig 29



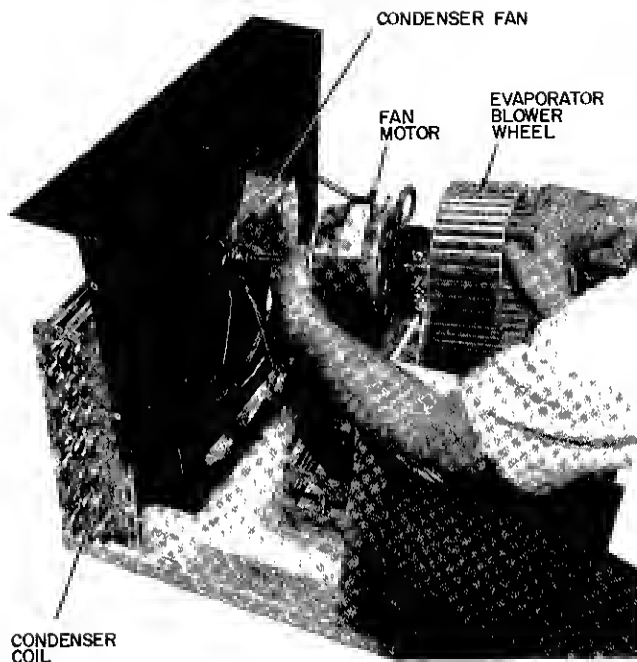


Fig. 32 — Evaporator Fan Section

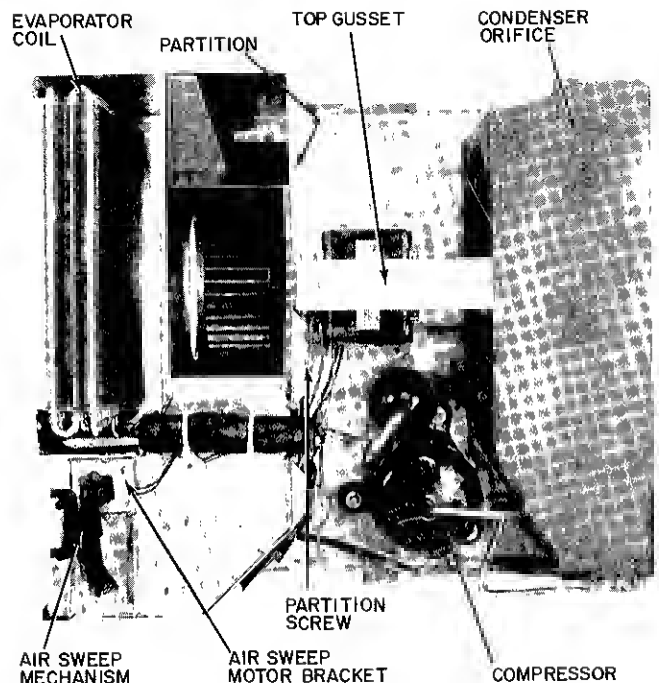


Fig. 33 — Chassis Top View

j Reverse above procedure for reassembly

NOTE When replacing fan motor, be sure motor oil ports are facing up

37 **Evaporator Fan** — See Evaporator Fan in Fig. 32

- a Remove fan section Refer to Fan Section instructions
- b Mark shaft at point where fan hub and shaft meet, to aid in reassembly
- c Loosen Allen set-screw which locks evaporator fan on motor shaft Some units have a spring metal clip which must be removed
- d Remove fan from motor shaft
- e For reassembly, reverse above procedure

38 **Condenser Fan** — See Condenser Fan in Fig. 32

- a Remove fan section Refer to Fan Section instructions
- b Mark shaft at point where fan hub and shaft meet for reassembly
- c Remove fan from motor shaft
- d Reverse above procedure for reassembly

39 **Fan Motor** — See Fan Motor in Fig. 32

- a Remove fan section Refer to Fan Section instructions
- b Remove both fans Refer to Evaporator Fan and Condenser Fan instructions
- c Reverse above procedure for reassembly

40 **Compressor** — See Compressor in Fig. 33 Before removing compressor, refer to Service, General Notes in this publication, and Carrier Standard Service Techniques Manual, Chapters 1 and 2

- a Remove compressor terminal cover See Fig. 21
- b Disconnect wires from compressor and overload protector terminals Mark wires to aid in reassembly
- c Replace overload protector if needed

d Disconnect piping Refer to Service in this publication being careful to observe all CAUTIONS

e Remove compressor mounting nuts See Fig. 23

f Remove compressor carefully Obtain help when lifting if necessary

g Reverse above procedure for reassembly

41 **Air Sweep Mechanism** — See Air Sweep Mechanism in Fig. 33

- a Remove chassis from casing Refer to Chassis instructions and Fig. 29
- b Remove partition top cover by removing 4 screws
- c Remove motor cover by removing 2 screws See Fig. 30
- d Remove link assembly by lifting straight up
- e Remove spring to disassemble link assembly
- f Remove cam from motor shaft
- g Remove motor and motor bracket from chassis by removing 2 screws
- h Remove motor from motor bracket by removing 2 screws
- i Slide out control box and disconnect air sweep motor leads Refer to Fan Cycle and Air Sweep Switches instruction
- j To remove discharge louvers, flex and remove pin from bottom hole Turn louver and pivot bottom upward to remove from top hole See Fig. 29 and 34

k Reverse above procedure for reassembly

42 **Evaporator and Condenser Coils** — See Evaporator and Condenser Coils in Fig. 32 and 33 These coils have copper tubing and the interconnecting tubing has been manufactured as an integral part of the coil to aid in servicing

- a Purge all refrigerant from system Refer to Service in this publication
- b Cut interconnecting tubing and remove evaporator coil from unit by removing 4 screws



- c Cut interconnecting tubing and remove 2 screws securing condenser coil. Remove condenser orifice mounting screws (4)
  - d Remove condenser coil
  - e Reverse procedure for reassembly
- 43 **Strainer** — Strainer is installed in the interconnecting tubing between the condenser and the capillary tube. To change strainer:
- a Purge and remove all refrigerant from system
  - b Cut tubing one in. from capillary tube insertion point
  - c Use a thin piece of wire to remove strainer from tubing
  - d Insert new strainer into tubing. Reassemble with a field-supplied 1/4-in. copper coupling
- 44 **Vent and Exhaust Linkage** — See Vent and Exhaust Linkage in Fig 31
- a Remove decorative front grille. Refer to Grille instructions and Fig 26
  - b Remove control box. Refer to Control Box instructions and Fig 25
  - c Remove clicker lever. Push up on lever handle while holding mount down. See Fig 34
  - d To reinstall, push clicker lever straight in through mount, until it snaps in place
  - e To remove mount, remove 2 screws from mount and remove from discharge deck
  - f To remove push bars, remove screws and disassemble from discharge deck. See Fig 31
  - g To reassemble, reverse above procedure
- 45 **Electric Heater Assembly** — See Electric Heater in Fig 35. The electric heater is found only in the Models 51CV and 51GY.
- a Remove chassis from casing. See Chassis instructions and Fig 29
  - b Remove partition top cover by removing 4 screws
  - c Remove 2 wires from heater assembly. Mark wires to aid in reassembly
  - d Repair or replace limit switches as needed
  - e Remove heater by removing 2 screws and lifting straight up
  - f Reverse above procedure for reassembly

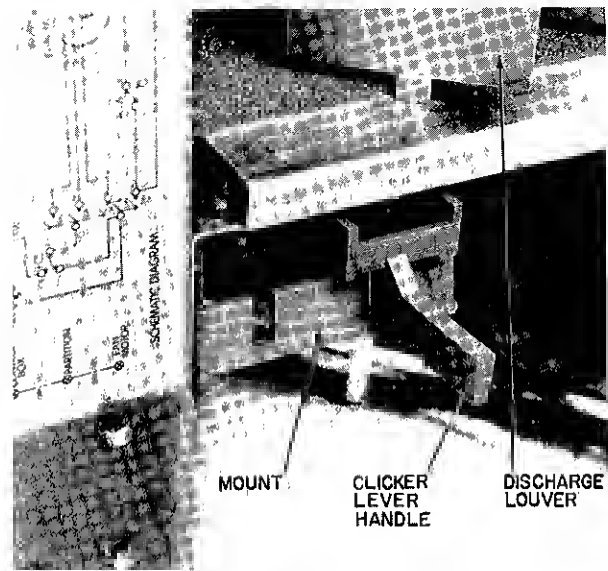


Fig 34 — Vent and Exhaust Linkage

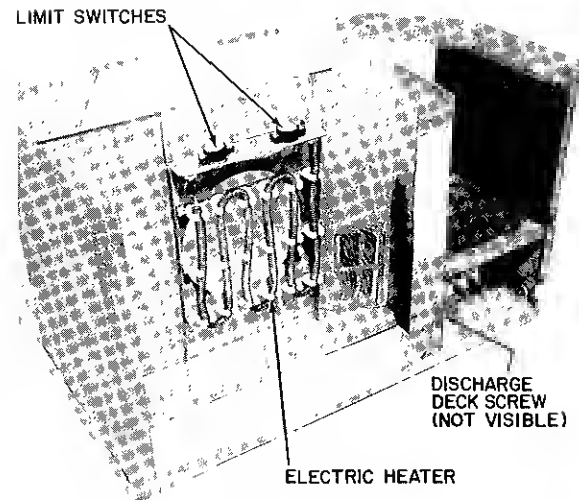


Fig. 35 — Electric Heater Assembly

## **TROUBLESHOOTING**

### **NO COOLING OR INSUFFICIENT COOLING**

#### **Compressor Does Not Run**

##### **OPENING IN POWER CIRCUIT**

- Control off
- Blown fuse
- Defective wiring
- Defective service cord
- Loose electrical connections
- Faulty switches, thermostat or fan

##### **COMPRESSOR POWER SUPPLY OPEN**

- Loose leads at compressor terminals
- Defective motor overload switch
- Defective capacitor
- Open compressor windings
- Seized compressor

#### **Compressor Runs But Cycles**

##### **FAN OPERATING ERRATICALLY**

- Loose lead at fan motor
- Motor defective or burned out
- Outdoor air restricted or recirculating

##### **OVERCHARGE OR NONCONDENSABLES IN SYSTEM**

##### **RESTRICTED DISCHARGE LINE**

##### **CYCLES ON COMPRESSOR OVERLOAD**

- Defective run capacitor
- Defective compressor bearings or valves
- Greatly restricted indoor air (iced indoor coil)
- Low refrigerant charge
- Indoor capillary restricted
- Liquid line restricted
- Compressor hot

#### **Compressor Runs But Insufficient Cooling**

##### **COOLING AIR NOT ADEQUATE**

- Dirty filter or coil
- Iced evaporator coil (slightly low refrigerant charge)
- Defective fan motor

##### **CONDENSER AIR NOT ADEQUATE**

- Outside air restricted
- Dirty coil
- Defective fan motor

##### **UNIT UNDERSIZE**

##### **AIR LEAKAGE**

##### **LIQUID LINE SLIGHTLY RESTRICTED**

- Capillary restricted

##### **COMPRESSOR FLOODING**

- Unit overcharged

## **SERVICE POINTS**

### **(Check Annually)**

- 1 Clean evaporator and condenser coils Indoors — Use a hooked wire or bristle brush to remove dirt from fins Outdoors — Use compressed air or a vacuum cleaner
- 2 Clean basepan and other painted surfaces
- 3 Clean all drain passages
- 4 Clean motor and fans
- 5 Vacuum clean the insulation
- 6 Paint parts that show evidence of rust with a good rust-resistant paint
- 7 Check refrigerant connections for evidence of leakage Repair if necessary
- 8 Check wires for deterioration
- 9 Check damper controls
- 10 Fans should be tight on motor shaft
- 11 Run the unit and eliminate any piping vibration





Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations

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